CLAIMS

1. A gas discharge panel having (a) a plurality of cells arranged in a matrix, each cell being filled with a discharge gas which is enclosed between a facing pair of substrates, and (b) plural pairs of display electrodes arranged on an inner surface of one of the substrates so as to extend in a row direction of the matrix, each pair of display electrodes comprising:

two bus lines, being parallel to each other and extending in the row direction of the matrix;

one or more inner protrusions, being arranged within each cell on an inner side of one or both of the bus lines so as to protrude toward an inner side of an opposite bus line; and

one or more outer protrusions, being arranged so as to protrude from an outer side of one or both of the bus lines.

2. The gas discharge panel of claim 1, wherein a relation $Pe = A \times Ps/n$ is satisfied in relation to the two bus lines, Pe being a pitch of either the inner or outer protrusions, Ps being a pitch of the cells along the row direction of the matrix, A being a positive value less than 1, and n being a natural number.

3. The gas discharge panel of claim 1, wherein the bus lines are composed of a metal and the inner and outer protrusions are composed of a transparent electrode material.

4. The gas discharge panel of claim 1, wherein the outer protrusions extend in a column direction of the matrix, a surface area of each of the outer protrusions being greater than a surface area of each of the inner protrusions.

5. The gas discharge panel of claim 4, wherein a width of each of the outer protrusions along the row direction of the matrix is wider as a distance from the bus line increases.

6. The gas discharge panel of claim 1, wherein a width of an end section of each of the inner protrusions along the row direction of the matrix is narrower than a base section thereof.

7. The gas discharge panel of claim 1, wherein a shortest discharge gap between the plural pairs of display electrodes corresponds to a minimum discharge firing voltage or a voltage in a vicinity thereof as shown on a Paschen curve plotting a relationship between a Pd product and a discharge firing voltage, P being a pressure of the discharge gas and d being a discharge gap.

8. The gas discharge panel of claim 1, wherein the inner surface of the substrate arranged with the plural pairs of display

electrodes is covered with an insulating layer, an area of the insulating layer that corresponds to a shortest discharge gap being composed of magnesium oxide and a remaining area thereof being composed of a material having a lower electron emission rate than magnesium oxide.

9. The gas discharge panel of claim 8, wherein the material having a lower electron emission rate than magnesium oxide is aluminum oxide.

~~10. The~~ gas discharge panel of claim 1, wherein the inner protrusions are provided on each of the two bus lines, the ends of the inner protrusions arranged on each of the bus lines being out of alignment along the row direction of the matrix.

11. The gas discharge panel of claim 10, wherein a relation Pe $=A \times Ps/n$ is satisfied in relation to the two bus lines, Pe being a pitch of either the inner or outer protrusions, Ps being a pitch of the cells along the row direction of the matrix, A being a positive value less than 1, and n being a natural number.

12. The gas discharge panel of claim 10, wherein the inner protrusions have squared ends along the row direction of the matrix, the squared ends of any two closest facing inner

protrusions being out of alignment such that a width in the row direction of the matrix of a section of the squared ends that face each other is 10 μm or less.

13. The gas discharge panel of claim 10, wherein the inner protrusions have tapered ends along the row direction of the matrix, the tapered ends of any two closest facing inner protrusions being out of alignment by 10 μm or more along the row direction of the matrix.

14. The gas discharge panel of claim 10, wherein a plurality of barrier ribs are formed between the pair of substrates along a column direction of the matrix, at least a section of the inner protrusions overlapping with the barrier ribs.

15. The gas discharge panel of claim 10, wherein the outer protrusions extend in a column direction of the matrix, a surface area of each of the outer protrusions being greater than a surface area of each of the inner protrusions.

16. The gas discharge panel of claim 10, wherein a width of each of the outer protrusions along the row direction of the matrix is wider as the distance from the bus line increases.

17. The gas discharge panel of claim 10, wherein a shape of the inner protrusions arranged on each of the bus lines is different.

18. The gas discharge panel of claim 10, wherein a shortest discharge gap between the plural pairs of display electrodes corresponds to a minimum discharge firing voltage or a voltage in a vicinity thereof as shown on a Paschen curve plotting a relationship between a Pd product and a discharge firing voltage, P being a pressure of the discharge gas and d being a discharge gap.

19. The gas discharge panel of claim 10, wherein the inner surface of the substrate arranged with the plural pairs of display electrodes is covered with an insulating layer, an area of the insulating layer that corresponds to a shortest discharge gap being composed of magnesium oxide and a remaining area thereof being composed of a material having a lower electron emission rate than magnesium oxide.

20. The gas discharge panel of claim 19, wherein the material having a lower electron emission rate than magnesium oxide is aluminum oxide.

21. A gas discharge panel having (a) a plurality of cells arranged in a matrix, each cell being filled with a discharge gas which is enclosed between a facing pair of substrates, and (b) plural pairs of display electrodes arranged on an inner surface of one of the substrates so as to extend in a row direction of the matrix, each pair of display electrodes comprising:

two bases, being parallel to each other and extending in the row direction of the matrix; and

one or more inner protrusions, being arranged within each cell on an inner side of each of the bases so as to protrude toward an inner side of an opposite base, the ends of the inner protrusions arranged on each of the bases being out of alignment along the row direction of the matrix.

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22. The gas discharge panel of claim 21, wherein a relation $Pe = A \times Ps/n$ is satisfied in relation to the two bus lines, Pe being a pitch of either the inner or outer protrusions, Ps being a pitch of the cells along the row direction of the matrix, A being a positive value less than 1, and n being a natural number.

23. The gas discharge panel of claim 21, wherein the inner protrusions have squared ends along the row direction of the matrix, the squared ends of any two closest facing inner

protrusions being out of alignment such that a width in the row direction of the matrix of a section of the squared ends that face each other is 10 μm or less.

24. The gas discharge panel of claim 21, wherein the inner protrusions have tapered ends along the row direction of the matrix, the tapered ends of any two closest facing inner protrusions being out of alignment by 10 μm or more along the row direction of the matrix.

25. The gas discharge panel of claim 21, wherein a plurality of barrier ribs are formed between the pair of substrates along a column direction of the matrix, at least a section of the inner protrusions overlapping with the barrier ribs.

26. The gas discharge panel of claim 21, wherein a shape of the inner protrusions arranged on each of the bases is different.

27. The gas discharge panel of claim 21, wherein a shortest discharge gap between the plural pairs of display electrodes corresponds to a minimum discharge firing voltage or a voltage in a vicinity thereof as shown on a Paschen curve plotting a relationship between a Pd product and a discharge firing voltage, P being a pressure of the discharge gas and d being a discharge

gap.

28. A gas discharge panel having (a) a plurality of cells arranged in a matrix, each cell being filled with a discharge gas which is enclosed between a facing pair of substrates, and (b) plural pairs of display electrodes arranged on an inner surface of one of the substrates so as to extend in a row direction of the matrix, each pair of display electrodes comprising:

two bases, being extended in a row direction of the matrix and snaking along the plural pairs of display electrodes.

29. The gas discharge panel of claim 28, wherein a wavelength of each of the bases is out of alignment by half a wavelength.

30. The gas discharge panel of claim 28, wherein the plural pairs of display electrodes are arranged so that a bus line part composed of a metal and extending in a row direction of the matrix is connected electrically to each of the bases.

31. The gas discharge panel of claim 30, wherein the bases are composed of a transparent electrode material.

32. The gas discharge panel of claim 28, wherein the bases are

composed of a metal.

33. A gas discharge panel having (a) a plurality of cells arranged in a matrix, each cell being filled with a discharge gas which is enclosed between a facing pair of substrates, and (b) plural pairs of display electrodes arranged on an inner surface of one of the substrates so as to extend in a row direction of the matrix, each pair of display electrodes comprising:

two bus lines, being extended in the row direction of the matrix; and

two bases, being connected electrically to and snaking along the bus lines, at least a section of the bases being arranged so as to be separate between two adjacent barrier ribs.

34. A method of manufacturing a gas discharge panel including (a) a display electrode arranging step for arranging plural pairs of display electrodes on a main surface of a first substrate so as to extend in a row direction, (b) an insulating layer covering step for covering the first substrate with an insulating layer, and (c) a cell forming step for forming a plurality of cells in a matrix by arranging the main surface of the first substrate to face a main surface of a second substrate with a plurality of barrier ribs extending in a column

direction interposed therebetween, each cell being an area in which a pair of display electrodes extend across two adjacent barrier ribs,

wherein the display electrode arranging step has a substep for arranging two bus lines, which are parallel to each other and extend in a same direction, and for providing inner protrusions, which are arranged within each cell on an inner side of one or both of the bus lines, and

the insulating layer covering step has a substep for forming an insulating layer, an area corresponding to a shortest discharge gap between the plural pairs of display electrodes being composed of magnesium oxide and a remaining area thereof being composed of a material having a lower electron emission rate than magnesium oxide.

35. The gas discharge panel of claim 34, wherein the material used in the substep of the insulating layer covering step having a lower electron emission rate than magnesium oxide is aluminum oxide.

36. A method of manufacturing a gas discharge panel including (a) a display electrode arranging step for arranging plural pairs of display electrodes on a main surface of a first substrate so as to extend in a row direction, (b) an insulating

layer covering step for covering the first substrate with an insulating layer, and (c) a cell forming step for forming a plurality of cells in a matrix by arranging the main surface of the first substrate to face a main surface of a second substrate with a plurality of barrier ribs extending in a column direction interposed therebetween, each cell being an area in which a pair of display electrodes extend across two adjacent barrier ribs,

wherein the display electrode arranging step sets a shortest discharge gap between the plural pairs of display electrodes according to a minimum discharge firing voltage or a voltage in a vicinity thereof as shown on a Paschen curve plotting a relationship between a Pd product and a discharge firing voltage, P being a pressure of the discharge gas and d being a discharge gap.

37. A method of manufacturing a gas discharge panel including (a) a display electrode arranging step for arranging plural pairs of display electrodes on a main surface of a first substrate so as to extend in a row direction, (b) an insulating layer covering step for covering the first substrate with an insulating layer, and (c) a cell forming step for forming a plurality of cells in a matrix by arranging the main surface of the first substrate to face a main surface of a second

substrate with a plurality of barrier ribs extending in a column direction interposed therebetween, each cell being an area in which a pair of display electrodes extend across two adjacent barrier ribs,

wherein the display electrode arranging step has a substep for arranging two bus lines, which are parallel to each other and extend in a same direction, and for providing inner protrusions, which are arranged within each cell on an inner side of one or both of the bus lines, the inner protrusions being provided in the substep so as to satisfy a relation $Pe=A\times Ps/n$, Pe being a pitch of either the inner or outer protrusions, Ps being a pitch of the cells along the row direction of the matrix, A being a positive value less than 1, and n being a natural number.

38. A gas discharge device having one or more pairs of electrodes arranged to face a discharge space filled with a discharge gas, wherein a voltage is applied to each of the electrodes so as to fire a discharge between the one or more pairs of electrodes and generate illumination, each pair of electrodes comprising:

two electrode bases, being extended in a same direction;

one or more inner protrusions, being arranged on an inner side of one or both of the electrode bases so as to protrude toward an inner side of an opposite electrode base; and

one or more outer protrusions, being arranged so as to protrude from an outer side of one or both of the electrode bases.

39. The gas discharge panel of claim 38, wherein each pair of electrodes has two electrode bases that extend in a same direction and snake along the one or more pairs of electrodes.

40. The gas discharge panel of claim 38, wherein the ends of the inner protrusions arranged on each of the electrode bases are out of alignment.

41. The gas discharge panel of claim 40, wherein each pair of electrodes has two electrode bases that extend in a same direction and snake along the one or more pairs of electrodes, a wavelength of each of the electrode bases being out of alignment.

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